Supporting Climate Change Risk Management in the Central Greece Region

The Challenge

The Region of Central Greece (Sterea Ellada) is one of the country's most diverse and strategically important areas. Spanning 15,549 square kilometres, it is bordered by Thessaly to the north, Western Greece to the west and south-west, and Attica to the south-east. The Corinthian Gulf lies to the south, and the Aegean Sea lies to the east. Home to 554,609 people, it is the second-largest Greek region by area. Its capital, Lamia, is a rapidly growing urban centre and the seventeenth-largest city in Greece. Meanwhile, Chalkida, the regional economic centre and the ninth largest city in Greece, is the main driver of commerce and development.

Central Greece is characterised by a variety of geomorphological, socio-economic and cultural features. Fertile plains coexist with mountain ranges, quarrying areas, forests and a long coastline dotted with islands and wetlands. The Kopaida plain, in particular, has long been one of the most important centres of agricultural production in Greece, supported by significant groundwater and surface water resources. Beyond agriculture, the region has developed a strong industrial base, particularly in the metallurgical sector. Bauxite and aluminium production have established the region's leadership in this field at national and European levels.

Figure 1 Location of Central Greece Region

Alongside this productive base, the region boasts cultural treasures of world renown, including the archaeological site of Delphi and the symbolic battlefield of Thermopylae. These sites attract cultural tourists and strengthen the region's international profile. Its large mountain ecosystems, biodiversity-rich coastal areas and unique landscapes also offer opportunities for the development of alternative energy sources and sustainable recreation. This rich and diverse identity is both a strength and a challenge. The very elements that make Central Greece productive and culturally significant also render it highly vulnerable to climate change pressures. Coastal and soil erosion threaten the availability of fertile land and undermine the stability of coastal settlements and infrastructure. Wildfires are becoming more frequent and severe and endanger extensive forested and mountainous areas. This leads to biodiversity loss, economic disruption in rural communities and heightened risks to human safety. Floods, intensified by extreme rainfall and altered land use, increasingly threaten urban centres, fertile plains and industrial zones, with serious consequences for infrastructure, trade and livelihoods.

The climate challenge in Central Greece is therefore multidimensional: it affects agriculture, industry, cultural heritage and ecosystems, and has a direct impact on the lives of its citizens. Addressing these risks requires immediate protective measures and a stronger knowledge base to inform decision-making. This includes improved information on local climate impacts, better insights into socio-economic vulnerabilities, and effective systems for monitoring environmental change. These tools can enable more targeted adaptation strategies, support integrated planning across sectors and ensure that responses are effective and sustainable. Strengthening the evidence base is crucial if the region is to harness its natural and cultural assets while safeguarding communities and economic activities against an increasingly uncertain climate future.

A Climate Impact Chain[1] (D2.1.) was generated for the Region of Central Greece (Evoia[2]). The impact chains reveal that the main climate impacts are driven by rising temperatures and changing precipitation regimes, which act as primary climate drivers intensifying compound hazards such as heatwaves, drought, wildfires, and extreme precipitation. Prolonged heat and reduced rainfall increase fuel dryness and water scarcity, escalating wildfire risk, while episodic heavy rainfall events trigger flooding that affects agricultural land and infrastructure. These hazards intersect strongly with local exposure patterns shaped by dispersed urban-rural settlements, tourism-oriented coastal development and forests. Exposure is further amplified by land-use change, expansion of housing into forested areas, and reliance on road networks and critical infrastructure located in flood-prone zones. Within the climate impact chains developed for Evoia, these factors translate hazards into risks through high exposure of built assets, transport corridors, and productive land to fire, heat stress, and flood damage.

Vulnerability within these impact chains is shaped by socio-economic dependence on agriculture, forestry, and tourism, combined with limited preventive capacity and institutional constraints in wildfire and flood management. Sensitivity is heightened by ageing infrastructure, fragmented land management, ecosystem degradation, and historical underinvestment in fire prevention, while adaptive capacity is uneven across sectors and territories. These vulnerability factors lead to cascading impacts, including damage to infrastructure and agricultural production, loss of ecosystem services, disruptions to livelihoods, and erosion of safety, wellbeing, and economic security.

> SDG 13: Climate Action calls for urgent action to combat climate change and its impacts by strengthening resilience and adaptive capacity worldwide. It emphasizes the integration of climate measures into national policies, strategies, and planning (Target 13.2), and the need to improve education, awareness, and institutional capacity for climate change mitigation, adaptation, and early warning (Target 13.3).

Accordingly, indicator selection for Central Greece prioritises metrics that capture the full risk transmission pathway—such as temperature and drought indices, fire weather indicators, flood intensity, land-use exposure, agricultural dependence, ecosystem condition, and institutional preparedness—ensuring that indicators reflect not only biophysical hazards but also locally salient vulnerabilities and socio-economic impacts identified through the participatory climate impact chain approach.

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[1] The Climate Impact Chain (VALORADA public deliverable 2.1: https://valorada-project.eu/downloads/) shows climate change mainly through higher temperatures and shifting rainfall patterns, which together intensify compound hazards—heatwaves and drought that raise wildfire risk, alongside episodes of extreme precipitation. These interconnected pressures create cascading impacts across water, ecosystems, land management and exposed assets, highlighting why impact chains are useful to trace how hazards turn into risk and where vulnerabilities amplify impacts.

[2] The findings are based on a two-day workshop held in Chalkida (Greece) on 23-24 November 2023, with the participation of local end-users, which defined, for the Region of Central Greece, the complete chain: drivers → hazards → exposure/vulnerability → impacts.

How can VALORADA help ?

In response to the increasing climate pressures faced by Central Greece, the VALORADA project has developed a set of climate indicators designed to improve understanding of, and monitoring of, the region's exposure to key climate risks. The process began with the creation of an initial list of indicators to characterise and quantify the interaction between territorial, environmental and socio-economic factors and changing climatic conditions. These indicators form the backbone of the regional analysis, providing the basis for evidence-based adaptation strategies. From this initial set, the most relevant indicators for Central Greece were selected in collaboration with regional stakeholders. The selection process also considered the availability and quality of the local data required for their calculation. Gathering non-climate data — ranging from demographic and infrastructural information to land-use and environmental datasets — proved an essential step, but it also revealed challenges such as data restrictions or inconsistencies with INSPIRE compliance standards. To ensure consistency with European methodologies, the project supplemented these data with climate projections obtained from the Copernicus Climate Data Store, enabling a robust and forward-looking evaluation of future conditions.

The tools and dashboards draw on a combination of European, national, and Earth-observation datasets to support the assessment of climate hazards, exposure, and impacts. Wildfire occurrence and impacts are based primarily on products from the Copernicus Emergency Management Service (CEMS), including multiple EMS Rapid Mapping activations (EMSR306, EMSR369, EMSR380, EMSR527, EMSR678, EMSR688, EMSR743, EMSR744), covering major wildfire events between 2018 and 2024. These datasets provide spatially explicit information on burned areas and fire-affected zones, forming the basis for mapping wildfire extent and recurrence. Building on this, the forest area impacted by wildfire is derived through the integration of Copernicus Emergency Management Service products with forest cover information from the Copernicus Land Monitoring Service, specifically the High Resolution Layer on Forest Type, enabling the quantification of wildfire impacts on forest ecosystems.

To capture environmental sensitivity and conservation priorities, the dashboards incorporate datasets on protected and ecologically important areas. Wildlife Refuge Areas are sourced from the National Spatial Data Infrastructure of Greece (geodata.gov.gr), provided by the Ministry of Digital Governance, while Natura 2000 sites are obtained from the European Environment Agency (EEA). These layers support the identification of overlaps between climate hazards and protected natural assets, highlighting potential impacts on biodiversity and ecosystem services.

Flood risk and exposure are represented using the officially designated Potentially High Flood Risk Zones (2019) from the Hellenic Ministry of Environment and Energy, which delineate areas prone to flooding under current risk assessments. These zones are combined with Copernicus Emergency Management Service data (e.g. EMSR697) to estimate the number of properties flooded during recent flood events. Population exposure is assessed by overlaying flood-prone areas with demographic data from the Hellenic Statistical Authority (ELSTAT), allowing the estimation of the number of people living in flood-prone areas and supporting social vulnerability analysis.

Coastal exposure and environmental protection are addressed through indicators such as the percentage of coastline under marine protection, which combines Copernicus Sentinel satellite data (European Space Agency) with national flood-risk zoning. Long-term coastline and waterline dynamics are supported by a time series of Landsat-5 and Landsat-8 products from the U.S. Geological Survey, alongside multi-year Copernicus Sentinel observations (2014-2023). These Earth-observation datasets provide consistent, spatially comparable information on coastal change and marine-related exposure.

Finally, soil erosion risk is supported through the use of the Revised Universal Soil Loss Equation (RUSLE), which integrates terrain, land cover, and climatic factors to assess potential soil loss. Together, these datasets provide the empirical backbone for the dashboards, enabling the translation of climate hazards into measurable impacts on ecosystems, infrastructure, and communities. Within VALORADA, the harmonisation, integration, and transparent documentation of these data sources enhances their usability for local decision-making and supports consistent, indicator-based climate risk assessments across regions.

The resulting VALORADA dashboard provides a comprehensive overview of climate and impact indicators for Central Greece. It combines two main categories of information. The first category comprises a wide range of standardised climate indicators derived from the Climate Data Store, including mean temperature, number of tropical nights, extreme precipitation and wind events, and flood occurrence. These indicators help to visualise climate trends and potential hazards over time and space. The second category consists of indicators that were specifically requested and co-designed with regional authorities to reflect local priorities. These include the number of people living in flood-prone areas, the number of properties affected by flooding each year, the number of critical infrastructures exposed to flood risks, the total forest area impacted by wildfires each year and the percentage of the coastline under marine protection. Together, these indicators connect climate data with the region's socio-economic and environmental realities, translating complex information into insights ready for decision-making. For these local indicators, the VALORADA dashboard draws upon a wide array of trusted data sources, including the Hellenic Ministry of Environment and Energy, the Copernicus Emergency Management Service (CEMS), the Copernicus Land Monitoring Service and the European Space Agency (ESA). Through this integration, the dashboard acts as a bridge between climate science and regional policymaking.
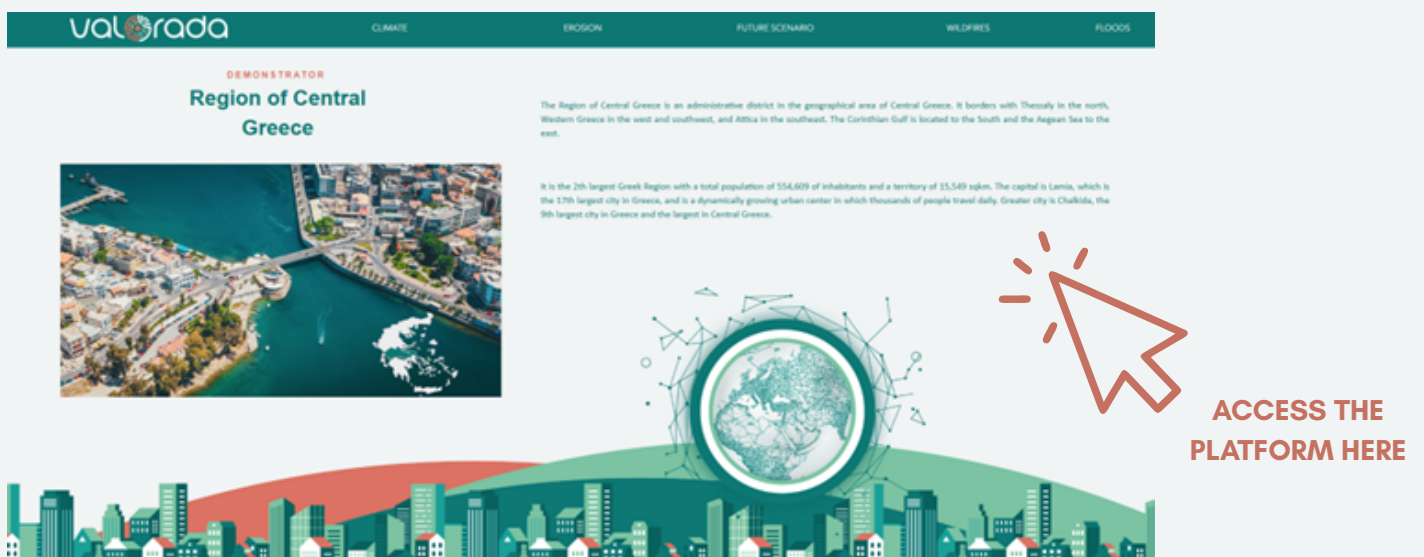

Figure 2 Welcome page of the platform for Central Greece

Who is concerned?

The Department of Environment and Spatial Planning of the Central Greece Regional administration is the primary authority responsible for climate adaptation within the region, serving as the crucial intermediary between national climate policy and local implementation. As a mid-level governance body, the Department translates European and national directives into place-based actions, ensuring that adaptation measures reflect local realities, priorities and vulnerabilities.

Under Greek national legislation, regional authorities are explicitly responsible for developing and applying climate adaptation strategies. The National Climate Law (Law 4936/2022) and the National Strategy for Climate Change Adaptation (NAS, adopted in 2016) provide the overarching framework for adaptation governance. Each of Greece's thirteen regions, including Central Greece, is required to prepare and implement a Regional Climate Change Adaptation Plan (RCCAP). These plans identify regional vulnerabilities, define adaptation priorities and propose measures that align with the objectives of the NAS. The Central Greece administration is therefore responsible for coordinating the preparation, monitoring and regular updating of its RCCAP as well as integrating climate considerations into regional development planning, infrastructure, land use, water management and civil protection.

In particular, the Region of Central Greece has developed a comprehensive strategy to strengthen resilience to climate change, fully aligned with Greece's National Strategy for Adaptation to Climate Change (NASACC). At the national level, the NASACC provides the framework for optimising decision-making, promoting sustainable development across sectors, and establishing mechanisms for monitoring, evaluation and public awareness. This is aided by the national council for adaptation to climate change, which consists of representatives from ministries, NGOs, trade unions, academia, and industry, and is in charge of monitoring and evaluation of climate adaptation policies[3]. Furthermore, in 2021, Ministry for Climate Crisis and Civil Protection was established, which is responsible for the national observatory for climate change adaptation. Building on this framework, the Regional Strategy for Adaptation to Climate Change (RESACC) focuses on enhancing resilience across three priority pillars: strengthening administrative capacity, promoting knowledge and skills, and advancing adaptation in key economic and environmental sectors.

The region faces increasing climate risks—rising temperatures, reduced rainfall, greater drought frequency, biodiversity loss, forest fires and pressure on water resources—all of which threaten agriculture, livestock, tourism, energy production, public health and infrastructure. To address these challenges, the RESACC defines targeted measures across priority sectors such as agriculture, tourism, forestry, transport, water management, coastal zones, cultural heritage and the built environment. Key interventions include coastal erosion monitoring, integrated forest-fire early-warning systems, projects for sustainable forest management, irrigation-water control tools, monitoring of sea and freshwater quality, vulnerability assessments of groundwater and soil systems, flood-protection master plans, and studies on climate impacts across ecosystems, crops, livestock and infrastructure.

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[3] https://www.europarl.europa.eu/RegData/etudes/BRIE/2025/772858/EPRS_BRI(2025)772858_EN.pdf

The region also invests in innovation, digital tools and civil-protection capacities, including early-warning platforms, climate observatories, agrometeorological networks and education initiatives for citizens and local authorities. Through participation in European programmes such as Horizon, Interreg and LIFE, Central Greece further strengthens research, pilot actions and cross-regional cooperation. Altogether, these efforts form an integrated approach that enhances preparedness, supports climate-resilient development and promotes coordinated action toward a sustainable and climate-secure future for Central Greece.

At the European level, these responsibilities are embedded in a broader legislative and policy framework. The EU Strategy on Adaptation to Climate Change (2021) calls for all regions and cities to become more resilient by 2050, emphasising improved data, risk assessment and cross-sectoral coordination. This strategy will be complemented by a new integrated framework for European climate resilience and risk management, which should be adopted by the end of 2026. This new framework aims to overcome existing barriers to climate adaptation and acknowledge the different nature of climate risks and impacts between EU members states and their regions. Furthermore, the European Climate Law (Regulation (EU) 2021/1119) establishes adaptation as a legal obligation, requiring Member States to develop coherent national and regional adaptation strategies and to report regularly on progress to support climate-resilient development in line with the Paris Agreement. Complementing this, the Regulation on the Governance of the Energy Union and Climate Action (EU) 2018/1999 imposes reporting obligations that require regions to contribute data and updates on adaptation policies, actions, and observed impacts. This information is then fed into national submissions to the European Environment Agency (EEA) and the European Commission. The regulation should be revised in 2026 to ensure an adequate response to the increasing impacts from climate change and other crises while fostering and supporting regional cooperation.

For the Region of Central Greece, this means that the regional administration must design and implement adaptation measures, as well as collect, assess and report data on climate risks, vulnerabilities and the effectiveness of adaptation actions. This information supports national and European reporting cycles while also informing local decision-making. In this way, the region ensures that adaptation is integrated into all policy areas, from spatial and economic planning to environmental protection and emergency management.

In the context of the region's specific climate challenges, the Regional Administration and specifically its Department of Environment and Spatial Planning play a central coordinating role. With regard to coastal and soil erosion, for example, it oversees land-use planning and coastal zone management policies aimed at preventing the degradation of valuable agricultural and coastal areas. Regarding wildfires, the regional administration collaborates closely with forestry services, civil protection authorities and municipalities to develop prevention, monitoring and rapid response mechanisms. Concerning flood risk, the administration coordinates regional infrastructure projects, risk mapping and early warning systems to protect settlements, agricultural land and critical infrastructure.

Across all these areas, the Regional Administration acts as the key integrator of scientific knowledge, local data and public action, ensuring that the Region of Central Greece builds resilience through informed, coordinated, and locally grounded adaptation efforts.
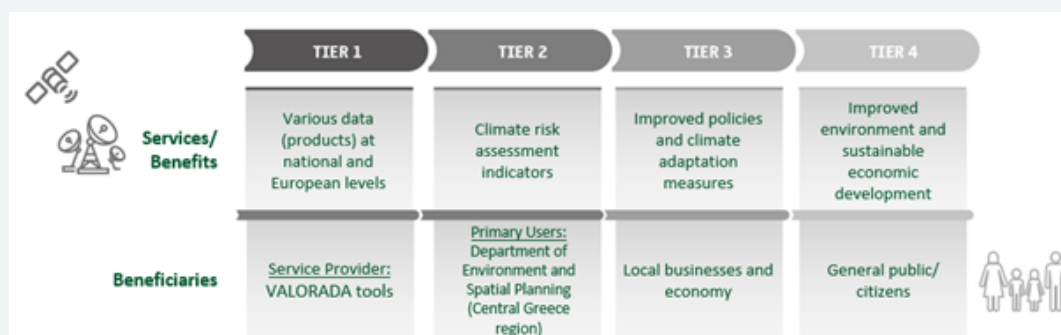

Figure 3 Value chain of the use case

What are the benefits?

Using the VALORADA tools generates a wide range of scientific, regulatory, societal, economic and environmental benefits, strengthening the capacity for climate adaptation across Central Greece region. By combining validated EO inputs with climate data and information, stakeholder-driven indicators and accessible dashboards, the tools improve the availability and usability of climate risk information. This supports more informed decision-making, more efficient governance processes and more resilient regional development. The following are the key benefits:

Regulatory

- Evidence-based policymaking enabled by VALORADA supports the design of regional adaptation measures aligned with EU and national strategies (tier 2)
- Harmonised stakeholder-driven indicators enable continuous assessment of climate risks and progress toward adaptation targets (tier 2)
- Facilitates RCCAP reporting obligations under the National Climate Law and EU Governance Regulation (tier 2)
- Public dashboards and visual tools improve stakeholder awareness of local hazards (tier 2, 4)
- Enables assessment of the effectiveness of adaptation actions over time (tier 2)
- Objective EO-based evidence supports transparency in public climate decision-making (tier 2)

Economic

- Avoided costs for developing new local data infrastructures thanks to access to Copernicus and VALORADA data services (tier 2)
- Reduced time and cost for gathering, harmonising and validating climate data due to integration through the VALORADA dashboard (tier 2)
- Faster access to validated risk indicators supports more efficient RCCAP updates and policy decisions (tier 2)

Societal

- Accessible risk information fosters climate literacy and proactive behaviour (tier 4)
- Common geospatial operational picture improves coordination among local authorities and emergency actors (tier 2)

Environmental

- Integration of ecosystem indicators helps target conservation in vulnerable coastal and forest zones (tier 4)
- More informed soil erosion management decisions help preserve fertile soils. (tier 2, 3)

Innovative/entrepreunarial

- New workflows for integrating EO data into planning processes and monitoring systems (tier 2)

Scientific

- Research outputs for all regions participating in VALORADA have already made and are expected from partner institutions (tier 1)
- Involvement of Greek researchers (Aristotle University of Thessaloniki) in data validation and indicator development (tier 1)
- Comprehensive insight into regional climate hazards and socio-economic vulnerabilities (tier 2)

Extended impact

The demonstrator indicates strong potential for wider replication, uptake and long-term sustainability. Geographically, the approach can be transferred to other Greek regions exposed to similar climate pressures – such as Thessaly, Western Greece and Attica – and to Mediterranean areas including Cyprus, Southern Italy and Malta that face escalating heat, drought, wildfire and flood hazards. There is also scope for scaling to other EU Mission Adaptation regions with comparable coastal and agricultural vulnerability profiles. In terms of institutional uptake, the methodology and tools can be adopted across Greece's thirteen regional administrations responsible for RCCAPs, as well as by national ministries such as Environment & Energy, Rural Development & Food and Civil Protection.

Municipalities, for example Lamia and Chalkida, can also integrate the outputs into local risk-management processes. The work further generates cross-sectoral benefits for private consultancies, insurers, agricultural operators and infrastructure companies that require localised climate-risk data; for universities and research institutes applying the indicators in vulnerability and adaptation studies; and for NGOs engaged in environmental management and civil-protection activities.

Citizens likewise benefit from clearer risk communication and increased transparency in planning. Technically, scalability is supported by a dashboard architecture and indicator framework that can be replicated with minimal customisation, and sustainability is strengthened through the use of open-source tools and Copernicus-based data that ensure long-term interoperability. Finally, the enhanced data-governance practices provide a model that can inform transnational cooperation across the wider South-East Mediterranean region.

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